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UNITED STATES PATENT APPLICATION

OF

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FOR

NOVEL COUPLERS OF 2,3,5-TRIAMINOPYRIDINE AND USE OF THE SAME FOR DYEING KERATIN FIBERS

[001] This application claims benefit of U.S. Provisional Application No. 60/467,124, filed May 2, 2003, the entire disclosure and subject matter of which is hereby incorporated herein by reference.

[002] Disclosed herein is a dye composition that is useful for dyeing keratin fibers, comprising at least one oxidation base and at least one coupler of the 2,3,5-triaminopyridine type, wherein the amino radical in position 2 forms a heterocyclic radical. Also disclosed herein is a process for dyeing keratin fibers using this composition. The disclosure also relates to novel compounds of the 2,3,5-triaminopyridine type that can be useful as couplers.

[003] It is known practice to dye keratin fibers, and for example, human hair, with dye compositions containing oxidation dye precursors, which are generally known as oxidation bases, such as ortho- or para-phenylenediamines, ortho- or para-aminophenols, and heterocyclic compounds. These oxidation bases can be colorless or weakly colored compounds which, when combined with oxidizing products, can give rise to colored compounds by a process of oxidative condensation.

[004] It is also known that the shades obtained with these oxidation bases can be varied by combining them with couplers or coloration modifiers, these agents being chosen, for example, from aromatic meta-diamines, meta-aminophenols, meta-diphenols and certain heterocyclic compounds such as indole compounds.

[005] The variety of molecules used as oxidation bases and couplers allows a wide range of colors to be obtained.

[006] It is desirable for the "permanent" coloration obtained by means of these oxidation dyes to satisfy a certain number of requirements. For example, such a coloration typically has at least one of the following properties: no toxicological drawbacks, allows

shades to be obtained in the desired strength, and shows good fastness with respect to external agents such as light, bad weather, washing, permanent-waving, perspiration, and rubbing.

[007] Other properties that may be possessed by such dyes include: allowing white hair to be covered and being as unselective as possible, i.e., producing the smallest possible differences in coloration along the same keratin fiber, which is generally differently sensitized (i.e., damaged) between its end and its root.

[008] Document FR 1 397 551 describes dye compositions containing oxidation dye precursors of the trisubstituted pyridine derivative type, each of the substituents possibly being a hydroxyl, alkoxy, amino or NR_1R_2 radical with R_1 and R_2 representing a H, alkyl or aryl. The coloration is obtained either by oxidation in air or with an oxidizing medium containing aqueous hydrogen peroxide solution at basic pH. On account of the high oxidizability of these pyridine precursors, the dyeing results obtained on the hair have a tendency to change over time by changing color, which turns out to be particularly unattractive.

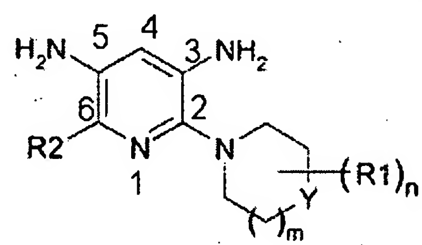
[009] However, few, if any, of these compositions make it possible to obtain strong colorations in varied shades that are uniform between the root and the end of the hairs, that show little selectivity and particularly good resistance, and that have good chromaticity.

[010] Thus, the present inventors propose dye compositions for dyeing keratin fibers, which do not have some or all of the drawbacks of the compositions of the prior art. For example, the dye compositions may make it possible to obtain strong, uniform dyeing results between the end and the root and may be resistant to external agents, while at the same time being capable of giving varied shades, for example, in fundamental shades such as chestnut, grey or black shades.

[011] Thus, disclosed herein is a dye composition comprising, in a medium that is suitable for dyeing:

- at least one oxidation base, and

- at least one 2,3,5-triaminopyridine coupler of formula (I), or a corresponding addition salt thereof:



Formula (I)

wherein:

- R_1 is chosen from:

  - a halogen atom, such as fluorine, chlorine or bromine;

  - a C_1-C_4 alkyl radical optionally substituted with at least one radical chosen from hydroxyl, carboxyl, (C_1-C_4) alkoxycarbonyl, carboxamido, C_1-C_4 alkylsulphonyl, C_1-C_4 alkoxy, C_1-C_4 alkylsulphonamido and NR_3R_4 radicals;

  - a carboxyl radical;

  - a (C_1-C_4)alkoxycarbonyl radical;

  - a carboxamido radical; (NH_2CO-)

  - a (C_1-C_4)alkylcarboxamido radical; (alkyl-NHCO- or (alkyl)$_2$NCO-)

  - a sulphinic radical; (HSO_2-)

  - a C_1-C_4 alkylsulphonyl radical; (-SO_2-alkyl)

  - a C_1-C_4 alkylsulphonamido radical; (alkylSO_2NH-)

- a hydroxyl radical;

- a C_1-C_4 alkoxy radical;

- a C_2-C_4 hydroxyalkoxy radical;

- a radical chosen from amino, monoaminoalkoxy and diaminoalkoxy radicals;

- a C_1-C_4 thioether radical;

- a C_1-C_4 alkylsulphoxy radical; (alkylSO-);

- a sulphonic radical; ($-SO_3H$); and

- a radical NR_5R_6;

• R_3, R_4, R_5 and R_6, which may be identical or different, are chosen from a hydrogen atom; a C_1-C_4 alkylsulphonyl radical; a (C_1-C_4) alkylcarbonyl radical in which the alkyl radical may be substituted with at least one hydroxyl radical; an arylcarbonyl radical, the aryl radical possibly being substituted with a radical chosen from hydroxyl, C_1-C_4 alkoxy, amino and (di)(C_1-C_4)alkylamino; a carboxamido radical; a C_1-C_4 alkyl radical optionally substituted with at least one radical chosen from hydroxyl, C_1-C_4 alkoxy, C_1-C_4 alkylsulphonyl, C_1-C_4 alkylsulphonamido, carboxyl, carboxamido, C_1-C_4 alkylsulphoxy, amino, (di)(C_1-C_4)alkylamino and C_2-C_4 (poly)hydroxyalkylamino radicals;

• R_2 is chosen from a hydrogen atom, a C_1-C_4 alkoxy radical optionally substituted with at least one radical chosen from hydroxyl and C_1-C_2 alkoxy radicals,

• n is an integer ranging from 0 to 7,

• m is 0, 1 or 2,

• Y is chosen from an oxygen atom, a radical $C(R_8)_2$ and a radical NR_7 in which R_7 has the same meaning as R_3, and

• R_8, which may be identical or different, is chosen from hydrogen or has the same meaning as R_1.

[012] Also disclosed herein is a process for dyeing keratin fibers, and also a device for dyeing using the disclosed composition.

[013] Finally, disclosed herein are the compounds of formula (I) and also the intermediate nitro compounds in the synthesis of the compounds of formula (I).

[014] In the context of the present disclosure, the term "alkyl" means linear or branched radicals, for example methyl, ethyl, n-propyl, isopropyl, butyl, etc. An alkoxy radical can be an alkyl-O radical, the alkyl radical having the definition given above.

[015] In the above formula, R_1, for example, is chosen from a C_1-C_4 alkoxy radical optionally substituted with at least one radical chosen from hydroxyl, C_1-C_2 alkoxy, amino or (di)alkylamino radicals; a hydroxyl radical; an amino radical; a (di)alkylamino radical; and a C_1-C_2 alkyl radical optionally substituted with a hydroxyl or an amino.

[016] According to another embodiment, R_2 is chosen from a hydrogen atom and an alkoxy radical.

[017] In the above formula (I), n, for example, is 0 or 1.

[018] R_3, R_4, R_5, R_6 and R_7, which may be identical or different, may be chosen from a hydrogen atom, a carboxamido radical and a C_1-C_4 alkyl radical optionally substituted with at least one radical chosen from hydroxyl, C_1-C_4 alkoxy, carboxamido, amino, (di)(C_1-C_4)alkylamino and C_2-C_4 (poly)hydroxyalkylamino radicals.

[019] For example, R_3, R_4, R_5, R_6 and R_7, which may be identical or different, are chosen from a hydrogen atom and from methyl, ethyl, 2-carboxyethyl, 2-hydroxyethyl, 3-hydroxypropyl, 2,3-dihydroxypropyl, 2-hydroxy-3-aminopropyl and 3-hydroxy-2-aminopropyl radicals. According to a further embodiment, R_3, R_4, R_5, R_6 and R_7, which may be identical or different, are chosen from a hydrogen atom, a methyl radical, a 2-hydroxyethyl radical and a 2,3-dihydroxypropyl radical.

[020] For example, at least one of the radicals R_8 is hydrogen.

[021] In formula (I), the nitrogen in position 2 of the ring, together with Y and m, may form a heterocyclic radical chosen from pyrrolidines, piperidines, homopiperidines, piperazines, homopiperazines and diazepanes (or 1,4-diazacycloheptane).

[022] According to one embodiment, the heterocycle is chosen from pyrrolidine, 2,5-dimethylpyrrolidine, 2-methylpyrrolidine, proline, 3-hydroxyproline, 4-hydroxyproline, 2,4-dicarboxypyrrolidine, 2-hydroxymethylpyrrolidine, 3-hydroxy-2-hydroxymethyl-pyrrolidine, 2,5-di(hydroxymethyl)pyrrolidine, 2-carboxamidopyrrolidine, 3-hydroxy-2-carboxamidopyrrolidine, 2-(dimethylcarboxamido)pyrrolidine, 2-(dimethylcarboxamido)-3-hydroxypyrrolidine, 3,4-dihydroxy-2-hydroxymethylpyrrolidine, 3-hydroxypyrrolidine, 3,4-dihydroxypyrrolidine, 3-aminopyrrolidine, 3-methylaminopyrrolidine, 3-dimethylamino-pyrrolidine, 4-amino-3-hydroxypyrrolidine, 4-methylamino-3-hydroxypyrrolidine, 3-hydroxy-4-(2-hydroxyethyl)aminopyrrolidine, piperidine, 2,6-dimethylpiperidine, 2-carboxypiperidine, 2-carboxamidopiperidine, 2-(dimethylcarboxamido)piperidine, 2-hydroxymethylpiperidine, 3-hydroxy-2-hydroxymethylpiperidine, 3-hydroxypiperidine, 4-hydroxypiperidine, 3-hydroxymethylpiperidine, homopiperidine, 2-carboxyhomopiperidine, 2-carboxamidohomopiperidine, piperazine, 4-methylpiperazine, diazepane, N-methyl-homopiperazine and N-β-hydroxyethylhomopiperazine, and the addition salts thereof.

[023] For example, the heterocycle may be chosen from pyrrolidine, 2-methylpyrrolidine, 3-hydroxypyrrolidine, 3-aminopyrrolidine, 3-(methylsulphonylamino)pyrrolidine, proline, 3-hydroxyproline, piperidine, hydroxypiperidine, homopiperidine, 4-methylpiperazine, diazepane, N-methylhomopiperazine and N-β-hydroxyethylhomopiperazine, and the addition salts thereof.

[024] According to yet another embodiment, the heterocycle is chosen from pyrrolidine, 3-hydroxypyrrolidine, 3-aminopyrrolidine, 3-(methylsulphonylamino)pyrrolidine, proline and 3-hydroxyproline.

[025] According to a further embodiment, in formula (I), R_1 is chosen from alkyl, amino, hydroxyalkyl and hydroxyl radicals, R_2 is hydrogen, m is 0 or 1, and n ranges from 0 to 2.

[026] The compounds of formula (I) that may be useful herein are, for example, the following compounds:

N-(3,5-diaminopyrid-2-yl)pyrrolidine;

N-(3,5-diaminopyrid-2-yl)-2-methylpyrrolidine;

N-(3,5-diaminopyrid-2-yl)-2,5-dimethylpyrrolidine;

N-(3,5-diaminopyrid-2-yl)-2-hydroxymethylpyrrolidine;

N-(3,5-diaminopyrid-2-yl)proline;

N-(3,5-diaminopyrid-2-yl)-3-hydroxypyrrolidine;

N-(3,5-diaminopyrid-2-yl)-2-hydroxymethyl-3-hydroxypyrrolidine;

N-(3,5-diaminopyrid-2-yl)-2-carboxamidopyrrolidine;

N-(3,5-diaminopyrid-2-yl)-2-dimethylcarboxamidopyrrolidine;

N-(3,5-diaminopyrid-2-yl)-3,4-dihydroxypyrrolidine;

N-(3,5-diaminopyrid-2-yl)-3-aminopyrrolidine;

N-(3,5-diaminopyrid-2-yl)-3-dimethylaminopyrrolidine;

N-(3,5-diaminopyrid-2-yl)piperidine;

N-(3,5-diaminopyrid-2-yl)-2,5-dimethylpiperidine;

N-(3,5-diaminopyrid-2-yl)-2-hydroxymethylpiperidine;

N-(3,5-diaminopyrid-2-yl)-2-carboxypiperidine;

N-(3,5-diaminopyrid-2-yl)-3-hydroxypiperidine;

N-(3,5-diaminopyrid-2-yl)-2-carboxamidopiperidine;

N-(3,5-diaminopyrid-2-yl)-2-dimethylcarboxamidopiperidine;

N-(3,5-diaminopyrid-2-yl)-4-hydroxypiperidine;

N-(3,5-diaminopyrid-2-yl)homopiperidine;

N-(3,5-diaminopyrid-2-yl)-2-carboxyhomopiperidine;

N-(3,5-diaminopyrid-2-yl)-4-methylpiperazine;

N-(3,5-diaminopyrid-2-yl)homopiperazine;

N-(3,5-diaminopyrid-2-yl)-N'-methylhomopiperazine;

N-(3,5-diaminopyrid-2-yl)-6-methoxypyrrolidine;

N-(3,5-diaminopyrid-2-yl)-6-methoxy-2,5-dimethylpyrrolidine;

N-(3,5-diaminopyrid-2-yl)-6-methoxy-2-hydroxymethylpyrrolidine;

N-(3,5-diaminopyrid-2-yl)-6-methoxyproline;

N-(3,5-diaminopyrid-2-yl)-6-methoxy-3-hydroxypyrrolidine;

N-(3,5-diaminopyrid-2-yl)-6-methoxy-2-hydroxymethyl-3-hydroxypyrrolidine;

N-(3,5-diaminopyrid-2-yl)-6-methoxy-2-carboxamidopyrrolidine;

N-(3,5-diaminopyrid-2-yl)-6-methoxy-2-dimethylcarboxamidopyrrolidine;

N-(3,5-diaminopyrid-2-yl)-6-methoxy-3,4-dihydroxypyrrolidine;

N-(3,5-diaminopyrid-2-yl)-6-methoxy-3-aminopyrrolidine;

N-(3,5-diaminopyrid-2-yl)-6-methoxy-3-dimethylaminopyrrolidine;

N-(3,5-diaminopyrid-2-yl)-6-methoxypiperidine;

N-(3,5-diaminopyrid-2-yl)-6-methoxy-2,5-dimethylpiperidine;

N-(3,5-diaminopyrid-2-yl)-6-methoxy-2-hydroxymethylpiperidine;

N-(3,5-diaminopyrid-2-yl)-6-methoxy-2-carboxypiperidine;

N-(3,5-diaminopyrid-2-yl)-6-methoxy-3-hydroxypiperidine;

N-(3,5-diaminopyrid-2-yl)-6-methoxy-2-carboxamidopiperidine;

N-(3,5-diaminopyrid-2-yl)-6-methoxy-2-dimethylcarboxamidopiperidine;

N-(3,5-diaminopyrid-2-yl)-6-methoxy-4-hydroxypiperidine;

N-(3,5-diaminopyrid-2-yl)-6-methoxyhomopiperidine;

N-(3,5-diaminopyrid-2-yl)-6-methoxy-2-carboxyhomopiperidine;

N-(3,5-diaminopyrid-2-yl)-6-methoxyhomopiperazine;

N-(3,5-diaminopyrid-2-yl)-6-methoxy-N'-methylhomopiperazine; and the addition salts thereof.

[027] In another embodiment, the compounds of formula (I) may be chosen from:

N-(3,5-diaminopyrid-2-yl)pyrrolidine;

N-(3,5-diaminopyrid-2-yl)-2-methylpyrrolidine;

N-(3,5-diaminopyrid-2-yl)-2,5-dimethylpyrrolidine;

N-(3,5-diaminopyrid-2-yl)-2-hydroxymethylpyrrolidine;

N-(3,5-diaminopyrid-2-yl)proline;

N-(3,5-diaminopyrid-2-yl)-3-hydroxypyrrolidine;

N-(3,5-diaminopyrid-2-yl)-2-carboxamidopyrrolidine;

N-(3,5-diaminopyrid-2-yl)-2-dimethylcarboxamidopyrrolidine;

N-(3,5-diaminopyrid-2-yl)-3,4-dihydroxypyrrolidine;

N-(3,5-diaminopyrid-2-yl)-3-aminopyrrolidine;

N-(3,5-diaminopyrid-2-yl)-3-dimethylaminopyrrolidine;

N-(3,5-diaminopyrid-2-yl)piperidine;

N-(3,5-diaminopyrid-2-yl)-4-methylpiperazine;

and the addition salts thereof.

[028] The oxidation dye composition disclosed herein comprises at least one oxidation base conventionally used in oxidation dyeing. By way of example, the at least one oxidation base may be chosen from para-phenylenediamines other than those described above, bis(phenyl)alkylenediamines, para-aminophenols, bis-para-aminophenols, ortho-aminophenols and heterocyclic bases, and the addition salts thereof.

[029] Among the para-phenylenediamines that may be mentioned, for example, can be para-phenylenediamine, para-toluenediamine, 2-chloro-para-phenylenediamine, 2,3-dimethyl-para-phenylenediamine, 2,6-dimethyl-para-phenylenediamine, 2,6-diethyl-para-phenylenediamine, 2,5-dimethyl-para-phenylenediamine, N,N-dimethyl-para-phenylenediamine, N,N-diethyl-para-phenylenediamine, N,N-dipropyl-para-phenylenediamine, 4-amino-N,N-diethyl-3-methylaniline, N,N-bis(β-hydroxyethyl)-para-phenylenediamine, 4-N,N-bis(β-hydroxyethyl)amino-2-methylaniline, 4-N,N-bis(β-hydroxyethyl)amino-2-chloroaniline, 2-β-hydroxyethyl-para-phenylenediamine, 2-fluoro-para-phenylenediamine, 2-isopropyl-para-phenylenediamine, N-(β-hydroxypropyl)-para-phenylenediamine, 2-hydroxymethyl-para-phenylenediamine, N,N-dimethyl-3-methyl-para-phenylenediamine, N-ethyl-N-(β-hydroxyethyl)-para-phenylenediamine, N-(β,γ-dihydroxypropyl)-para-phenylenediamine, N-(4'-aminophenyl)-para-phenylenediamine, N-phenyl-para-phenylenediamine, 2-β-hydroxyethyloxy-para-phenylenediamine, 2-β-acetylaminoethyloxy-para-phenylenediamine, N-(β-methoxyethyl)-para-phenylenediamine, 4-aminophenylpyrrolidine, 2-thienyl-para-phenylenediamine, 2-β-hydroxyethylamino-5-aminotoluene and 3-hydroxy-1-(4'-aminophenyl)pyrrolidine, and the acid addition salts thereof.

[030] For example, the the para-phenylenediamines may be chosen from para-phenylenediamine, para-toluenediamine, 2-isopropyl-para-phenylenediamine, 2-β-hydroxyethyl-para-phenylenediamine, 2-β-hydroxyethyloxy-para-phenylenediamine, 2,6-dimethyl-para-phenylenediamine, 2,6-diethyl-para-phenylenediamine, 2,3-dimethyl-para-phenylenediamine, N,N-bis-(β-hydroxyethyl)-para-phenylenediamine, 2-chloro-para-phenylenediamine and 2-β-acetylaminoethyloxy-para-phenylenediamine, and the acid addition salts thereof.

[031] Among the bis(phenyl)alkylenediamines that may be mentioned, for example, are N,N'-bis(β-hydroxyethyl)-N,N'-bis(4'-aminophenyl)-1,3-diaminopropanol, N,N'-bis(β-hydroxyethyl)-N,N'-bis(4'-aminophenyl)ethylenediamine, N,N'-bis(4-aminophenyl)tetramethylenediamine, N,N'-bis(β-hydroxyethyl)-N,N'-bis(4-aminophenyl)tetramethylenediamine, N,N'-bis(4-methylaminophenyl)tetramethylenediamine, N,N'-bis(ethyl)-N,N'-bis(4'-amino-3'-methylphenyl)ethylenediamine and 1,8-bis(2,5-diaminophenoxy)-3,6-dioxaoctane, and the acid addition salts thereof.

[032] Among the para-aminophenols that may be mentioned, for example, are para-aminophenol, 4-amino-3-methylphenol, 4-amino-3-fluorophenol, 4-amino-3-hydroxymethylphenol, 4-amino-2-methylphenol, 4-amino-2-hydroxymethylphenol, 4-amino-2-methoxymethylphenol, 4-amino-2-aminomethylphenol, 4-amino-2-(β-hydroxyethylaminomethyl)phenol and 4-amino-2-fluorophenol, and the acid addition salts thereof.

[033] Among the ortho-aminophenols that may be mentioned, for example, are 2-aminophenol, 2-amino-5-methylphenol, 2-amino-6-methylphenol and 5-acetamido-2-aminophenol, and the acid addition salts thereof.

[034] Among the heterocyclic bases that may be mentioned, for example, are pyridine derivatives, pyrimidine derivatives and pyrazole derivatives.

[035] Among the pyridine derivatives that may be mentioned are the compounds described, for example, in patents GB 1 026 978 and GB 1 153 196, and 2,5-diaminopyridine, 2-(4-methoxyphenyl)amino-3-aminopyridine, 2,3-diamino-6-methoxypyridine, 2-(β-methoxyethyl)amino-3-amino-6-methoxypyridine and 3,4-diaminopyridine, and the acid addition salts thereof

[036] Other pyridine oxidation bases that may be useful are the 3-aminopyrazolo[1,5-a]pyridine oxidation bases or addition salts thereof described, for example, in patent application FR 2 801 308. Examples that may be mentioned comprise pyrazolo[1,5-a]pyrid-3-ylamine, 2-acetylaminopyrazolo[1,5-a]pyrid-3-ylamine, 2-morpholin-4-ylpyrazolo[1,5-a]pyrid-3-ylamine, 3-aminopyrazolo[1,5-a]pyridine-2-carboxylic acid, 2-methoxypyrazolo[1,5-a]pyrid-3-ylamino, (3-aminopyrazolo[1,5-a]pyrid-7-yl)methanol, 2-(3-aminopyrazolo[1,5-a]pyrid-5-yl)ethanol, 2-(3-aminopyrazolo[1,5-a]pyrid-7-yl)ethanol, (3-aminopyrazolo[1,5-a]pyrid-2-yl)methanol, 3,6-diaminopyrazolo[1,5-a]pyridine, 3,4-diaminopyrazolo[1,5-a]pyridine, pyrazolo[1,5-a]pyridine-3,7-diamine, 7-morpholin-4-ylpyrazolo[1,5-a]pyrid-3-ylamine, pyrazolo[1,5-a]pyridine-3,5-diamine, 5-morpholin-4-ylpyrazolo[1,5-a]pyrid-3-ylamine, 2-[(3-aminopyrazolo[1,5-a]pyrid-5-yl)(2-hydroxyethyl)amino]ethanol, 2-[(3-aminopyrazolo[1,5-a]pyrid-7-yl)(2-hydroxyethyl)amino]ethanol, 3-aminopyrazolo[1,5-a]pyridin-5-ol, 3-aminopyrazolo[1,5-

a]pyridin-4-ol, 3-aminopyrazolo[1,5-a]pyridin-6-ol and 3-aminopyrazolo[1,5-a]pyridin-7-ol, and the addition salts thereof with an acid or with a base.

[037] Among the pyrimidine derivatives that may be mentioned are the compounds described, for example, in patents DE 2 359 399; JP 88-169 571; JP 05-63124; EP 0 770 375 or patent application WO 96/15765, for instance 2,4,5,6-tetraaminopyrimidine, 4-hydroxy-2,5,6-triaminopyrimidine, 2-hydroxy-4,5,6-triaminopyrimidine, 2,4-dihydroxy-5,6-diaminopyrimidine and 2,5,6-triaminopyrimidine, pyrazolopyrimidine derivatives such as those mentioned in patent application FR-A-2 750 048, and among which mention may be made of pyrazolo[1,5-a]pyrimidine-3,7-diamine, 2,5-dimethylpyrazolo[1,5-a]pyrimidine-3,7-diamine, pyrazolo[1,5-a]pyrimidine-3,5-diamine, 2,7-dimethylpyrazolo[1,5-a]pyrimidine-3,5-diamine, 3-aminopyrazolo[1,5-a]pyrimidin-7-ol, 3-aminopyrazolo[1,5-a]pyrimidin-5-ol, 2-(3-aminopyrazolo[1,5-a]pyrimidin-7-ylamino)ethanol, 2-(7-aminopyrazolo[1,5-a]pyrimidin-3-ylamino)ethanol, 2-[(3-aminopyrazolo[1,5-a]pyrimidin-7-yl)(2-hydroxyethyl)amino]ethanol, 2-[(7-aminopyrazolo[1,5-a]pyrimidin-3-yl)(2-hydroxyethyl)amino]ethanol, 5,6-dimethylpyrazolo[1,5-a]pyrimidine-3,7-diamine, 2,6-dimethylpyrazolo[1,5-a]pyrimidine-3,7-diamine, 2,5,-N7,N7-tetramethylpyrazolo[1,5-a]pyrimidine-3,7-diamine and 3-amino-5-methyl-7-imidazolylpropylaminopyrazolo[1,5-a]pyrimidine, and the acid addition salts thereof, and the tautomeric forms thereof, when a tautomeric equilibrium exists.

[038] Among the pyrazole derivatives that may be mentioned are the compounds described in patents DE 3 843 892 and DE 4 133 957, and patent applications WO 94/08969, WO 94/08970, FR-A-2 733 749 and DE 195 43 988, for instance 4,5-diamino-1-methylpyrazole, 4,5-diamino-1-(β-hydroxyethyl)pyrazole, 3,4-diaminopyrazole, 4,5-diamino-1-(4'-chlorobenzyl)pyrazole, 4,5-diamino-1,3-dimethylpyrazole, 4,5-diamino-3-

methyl-1-phenylpyrazole, 4,5-diamino-1-methyl-3-phenylpyrazole, 4-amino-1,3-dimethyl-5-hydrazinopyrazole, 1-benzyl-4,5-diamino-3-methylpyrazole, 4,5-diamino-3-tert-butyl-1-methylpyrazole, 4,5-diamino-1-tert-butyl-3-methylpyrazole, 4,5-diamino-1-(β-hydroxyethyl)-3-methylpyrazole, 4,5-diamino-1-ethyl-3-methylpyrazole, 4,5-diamino-1-ethyl-3-(4'-methoxyphenyl)pyrazole, 4,5-diamino-1-ethyl-3-hydroxymethylpyrazole, 4,5-diamino-3-hydroxymethyl-1-methylpyrazole, 4,5-diamino-3-hydroxymethyl-1-isopropylpyrazole, 4,5-diamino-3-methyl-1-isopropylpyrazole, 4-amino-5-(2'-aminoethyl)amino-1,3-dimethylpyrazole, 3,4,5-triaminopyrazole, 1-methyl-3,4,5-triaminopyrazole, 3,5-diamino-1-methyl-4-methylaminopyrazole and 3,5-diamino-4-(β-hydroxyethyl)amino-1-methylpyrazole, and the acid addition salts thereof.

[039] The at least one oxidation base present in the dye composition disclosed herein may be present in an amount ranging from 0.001% to 10% by weight approximately, and for example, from 0.005% to 6% by weight approximately, relative to the total weight of the dye composition.

[040] The composition disclosed herein may also comprise at least one conventional coupler in the field of dyes other than the couplers of formula (I). Among these additional couplers, those that may be mentioned, for example, are meta-phenylenediamines, meta-aminophenols, meta-diphenols, naphthalene-based couplers and heterocyclic couplers and the addition salts thereof.

[041] Examples that may be mentioned include 2-methyl-5-aminophenol, 5-N-(β-hydroxyethyl)amino-2-methylphenol, 6-chloro-2-methyl-5-aminophenol, 3-aminophenol, 1,3-dihydroxybenzene, 1,3-dihydroxy-2-methylbenzene, 4-chloro-1,3-dihydroxybenzene, 2,4-diamino-1-(β-hydroxyethyloxy)benzene, 2-amino-4-(β-hydroxyethylamino)-1-methoxybenzene, 1,3-diaminobenzene, 1,3-bis(2,4-diaminophenoxy)propane, 3-

ureidoaniline, 3-ureido-1-dimethylaminobenzene, sesamol, 1-β-hydroxyethylamino-3,4-methylenedioxybenzene, α-naphthol, 2-methyl-1-naphthol, 6-hydroxyindole, 4-hydroxyindole, 4-hydroxy-N-methylindole, 2-amino-3-hydroxypyridine, 6-hydroxybenzomorpholine, 3,5-diamino-2,6-dimethoxypyridine, 1-N-(β-hydroxyethyl)amino-3,4-methylenedioxybenzene and 2,6-bis(β-hydroxyethylamino)toluene, and the acid addition salts thereof.

[042] In the composition disclosed herein, the coupler(s), i.e., the at least one 2,3,5-triaminopyridine coupler and any additional coupler(s), may be present in an amount ranging from 0.001% to 10% by weight approximately, and for example, from 0.005% to 6% by weight approximately, relative to the total weight of the dye composition.

[043] In general, the addition salts of the oxidation bases and of the couplers that may be used in the context of the present disclosure are chosen, for example, from the acid addition salts, such as the hydrochlorides, hydrobromides, sulphates, citrates, succinates, tartrates, lactates, tosylates, benzenesulphonates, phosphates and acetates, and the base addition salts, such as sodium hydroxide, potassium hydroxide, aqueous ammonia, amines or alkanolamines.

[044] The dye composition in accordance with at least one embodiment herein may also comprise at least one direct dye that may be chosen from, for example, nitrobenzene dyes, azo direct dyes and methine direct dyes. These direct dyes may be of nonionic, anionic or cationic nature.

[045] The dye composition disclosed herein may be useful for dyeing keratin fibers, such as human keratin fibers. The medium may be a cosmetic medium that is suitable for dyeing these fibers.

[046] This medium suitable for dyeing, also known as a dye support, generally comprises water or a mixture of water and at least one organic solvent to dissolve the compounds that would not be sufficiently soluble in the water. Examples of organic solvents that may be mentioned include C_1-C_4 lower alkanols, such as ethanol and isopropanol; polyols and polyol ethers, for instance 2-butoxyethanol, propylene glycol, propylene glycol monomethyl ether, diethylene glycol monoethyl ether and monomethyl ether, and also aromatic alcohols, for instance benzyl alcohol or phenoxyethanol, and mixtures thereof.

[047] The solvents are, for example, present in proportions ranging from 1% to 40% by weight approximately, such as ranging from 5% to 30% by weight approximately, relative to the total weight of the dye composition.

[048] The dye composition disclosed herein may also contain various adjuvants conventionally used in hair dye compositions, such as anionic, cationic, nonionic, amphoteric or zwitterionic surfactants or mixtures thereof, anionic, cationic, nonionic, amphoteric or zwitterionic polymers or mixtures thereof, mineral or organic thickeners, and for example, anionic, cationic, nonionic and amphoteric polymeric associative thickeners, antioxidants, penetrating agents, sequestering agents, fragrances, buffers, dispersants, conditioners, for instance volatile or non-volatile, modified or unmodified silicones, film-forming agents, ceramides, preserving agents and opacifiers.

[049] The above adjuvants may be present in an amount for each ranging from 0.01% to 20% by weight approximately, relative to the total weight of the dye composition.

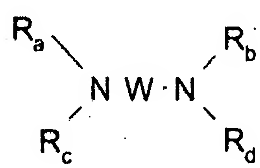
[050] Needless to say, a person skilled in the art should take care to select this or these additional optional compound(s) such that the advantageous properties intrinsically

associated with the oxidation dye composition in accordance with at least one embodiment may not, or may not substantially, be adversely affected by the envisaged addition(s).

[051] The pH of the dye composition disclosed herein ranges from 3 to 12 approximately and for example, ranges from 5 to 11 approximately. It may be adjusted to the desired value by means of acidifying or basifying agents usually used for dyeing keratin fibers, or alternatively using standard buffer systems.

[052] Among the acidifying agents that may be mentioned, for example, are mineral or organic acids, for instance hydrochloric acid, orthophosphoric acid, sulphuric acid, carboxylic acids, for instance acetic acid, tartaric acid, citric acid or lactic acid, and sulphonic acids.

[053] Among the basifying agents that may be mentioned, for example, are aqueous ammonia, alkaline carbonates, alkanolamines such as monoethanolamine, diethanolamine and triethanolamine and derivatives thereof, sodium hydroxide, potassium hydroxide and the compounds of formula (III) below:


(III)

in which W is a propylene residue optionally substituted with a hydroxyl group or a C_1-C_4 alkyl radical; R_a, R_b, R_c and R_d, which may be identical or different, are chosen from a hydrogen atom, and from C_1-C_4 alkyl and C_1-C_4 hydroxyalkyl radicals.

[054] The dye composition disclosed herein may be in various forms, such as in the form of liquids, creams or gels, or in any other form that is suitable for dyeing keratin fibers, and for example, human hair.

[055] The process disclosed herein is a process in which the dye composition as defined above is applied to the fibers, in the presence of an oxidizing agent, for a time that is sufficient to develop the desired coloration. The color may be revealed at acidic, neutral or alkaline pH and the oxidizing agent may be added to the dye composition just at the time of use, or it may be introduced using an oxidizing composition containing it, applied simultaneously with or sequentially to the dye composition.

[056] According to at least one embodiment, the dye composition disclosed herein is mixed, for example, at the time of use, with a composition comprising, in a medium that is suitable for dyeing, at least one oxidizing agent, this oxidizing agent being present in an amount that is sufficient to develop a coloration. The mixture obtained is then applied to the keratin fibers. After a leave-in time ranging from 3 to 50 minutes approximately and for example, ranging from 5 to 30 minutes approximately, the keratin fibers are rinsed, washed with shampoo, optionally rinsed again, and then dried.

[057] The oxidizing agents conventionally used for the oxidation dyeing of keratin fibers may be, for example, hydrogen peroxide, urea peroxide, alkali metal bromates, persalts such as perborates and persulphates, peracids, and oxidase enzymes, among which mention may be made of peroxidases, 2-electron oxidoreductases such as uricases, and 4-electron oxygenases, for instance laccases. In one embodiment, the oxidizing agent used is hydrogen peroxide.

[058] The oxidizing composition may also contain various adjuvants conventionally used in hair dye compositions and as defined above.

[059] The pH of the oxidizing composition containing the oxidizing agent is such that, after mixing with the dye composition, the pH of the resulting composition applied to the keratin fibers for example, ranges from 3 to 12 approximately and for example, ranges

from 5 to 11 approximately. Further, the pH may range from 6 to 8 approximately. It may be adjusted to the desired value by means of acidifying or basifying agents usually used in the dyeing of keratin fibers and as defined above.

[060] The ready-to-use composition that is finally applied to the keratin fibers may be in various forms, such as in the form of liquids, creams or gels, or in any other form that is suitable for dyeing keratin fibers, and for example, human hair.

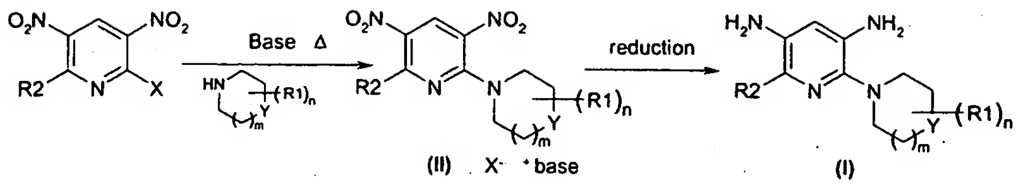
[061] The composition disclosed herein may be in the form of a kit. Such a kit comprises a dye composition as defined above, and an oxidizing composition.

[062] A further embodiment is a multi-compartment kit, in which a first compartment comprises the dye composition defined above and a second compartment comprises an oxidizing agent. This kit may be equipped with a means for applying the desired mixture to the hair, such as the devices described in patent FR 2 586 913 in the name of the Applicant.

[063] Using this kit, it may be possible to dye keratin fibers using a process that involves mixing a dye composition as disclosed herein with an oxidizing agent, and applying the mixture obtained to the keratin fibers for a time that is sufficient to develop the desired coloration.

[064] Further, additionally disclosed herein are the 2,3,5-triaminopyridine compounds of formula (I), and also the corresponding addition salts thereof as defined above.

[065] These compounds may be synthesized according to the following synthetic scheme:



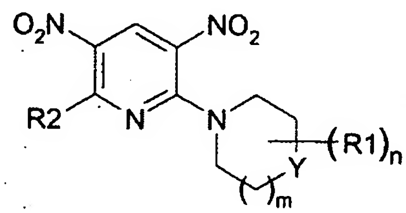
X is chosen from a halogen atom such as a chlorine or bromine, or a C_1-C_2 alkoxy radical, and R_2, R_1, n and m are as defined above.

[066] The compounds of formula (II) may be obtained by dissolving, with stirring, a 2-halo-3,5-dinitropyridine or 2-alkoxy-3,5-dinitropyridine such as 2-chloro-3,5-dinitropyridine or 2-methoxy-3,4-dinitropyridine in a protic or aprotic solvent with a boiling point of between 60°C and 180°C, for instance dioxane, DMF, THF, a lower alcohol or water, and in the presence of an organic or mineral base that can form a salt with the ion released. The cyclic amine is then introduced dropwise. The temperature of the reaction medium generally ranges from 25°C to 100°C. After disappearance of the reagents, the reaction medium is cooled to room temperature and poured into a mixture of ice and water. The precipitate thus formed is filtered off by suction of a sinter funnel, washed with water and then dried under vacuum to constant weight.

[067] The compounds of formula (I) may then be obtained by reducing the nitro precursors of formula (II) either by catalytic hydrogenation, or by hydrogen transfer, or with a metal such as zinc, tin or iron, or with a hydride such as sodium borohydride or lithium aluminium hydride. For example, the reaction used can be heterogeneous catalytic hydrogenation or phase-transfer with cyclohexene. The solvent may be a protic or aprotic solvent and for example, an alcohol with a boiling point ranging from 66°C to 160°C. The catalyst may be conventionally palladium-on-charcoal. The hydrogenation reaction may be

generally performed at a temperature ranging from 25°C to 80°C under a hydrogen pressure ranging from 1 bar to 40 bar and for example, ranging from 1 bar to 8 bar.

[068] Disclosed herein are also the nitro compounds of formula (II)



in which R_2, R_1, Y, n and m are as defined above.

[069] For example, in the above formula, when R_2 is chosen from hydrogen, then the heterocycle is not chosen from a pyrrolidine (n = 0, m = 0, Y = CH), a piperidine (n = 0, m = 1, Y = CH) and a piperazine (n = 0, m = 1, Y = NH).

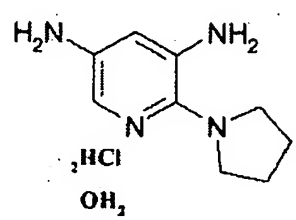
[070] Other than in the examples, or where otherwise indicated, all numbers expressing quantities of ingredients, reaction conditions, and so forth used in the specification and claims are to be understood as being modified in all instances by the term "about." Accordingly, unless indicated to the contrary, the numerical parameters set forth in the following specification and attached claims are approximations that may vary depending upon the desired properties sought to be obtained herein. At the very least, and not as an attempt to limit the application of the doctrine of equivalents to the scope of the claims, each numerical parameter should be construed in light of the number of significant digits and ordinary rounding approaches.

[071] Notwithstanding that the numerical ranges and parameters setting forth the broad scope are approximations, the numerical values set forth in the specific examples

are reported as precisely as possible. Any numerical value, however, inherently contain certain errors necessarily resulting from the standard deviation found in their respective testing measurements. The following examples are intended to illustrate the invention without limiting the scope as a result.

EXAMPLES OF SYNTHESIS:

Example 1: N-(3,5-diaminopyrid-2-yl)pyrrolidine dihydrochloride monohydrate



Protocol A:

Synthesis of 3,5-dinitro-2-pyrrolidin-1-ylpyridine

[072] 2.2 g (0.03 mol) of pyrrolidine were added over 10 minutes to a solution containing 3 g (0.015 mol) of 2-chloro-3,5-dinitropyridine in 30 ml of dioxane, at 40°C. The reaction medium was maintained at 60°C until the reagents disappeared. The reaction medium was then poured into a water/ice mixture with vigorous stirring and the precipitate was filtered off by suction, washed with water and then dried to constant weight to give 3.2 g of 3,5-dinitro-2-pyrrolidin-1-ylpyridine.

[073] The mass spectrometry and NMR analyses were in compliance.

Protocol B:

- Synthesis of N-(3,5-diaminopyrid-2-yl)pyrrolidine ·x HCl·y H_2O·z ROH:

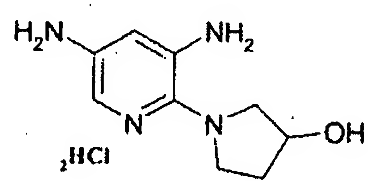
[074] 4 g (0.0168 mol) of 3,5-dinitro-2-pyrrolidin-1-ylpyridine, obtained according to Protocol A from 2-chloro-3,5-dinitropyridine and pyrrolidine, was reduced in an autoclave in 100 ml of ethanol in the presence of 10% palladium-on-charcoal under a pressure of 8 bar at room temperature. After disappearance of the reagents, the catalyst was removed by filtration, the filtrate was acidified with hydrochloric acid and the reduced derivative was isolated in the form of the dihydrochloride monohydrate.

[075] After drying, 3.7 g of solid was obtained.

[076] Elemental analysis of the dihydrochloride monohydrate

Theory	C: 40.16	H: 6.74	N: 20.81	Cl: 26.34
Found	C: 40.43	H: 6.30	N: 20.34	Cl: 26.82

Example 2: Synthesis of N-(3,5-diaminopyrid-2-yl)-3-hydroxypyrrolidine dihydrochloride

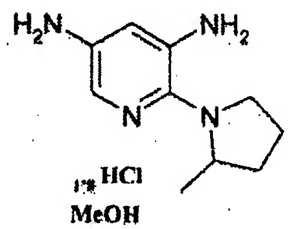


[077] 2 g (0.01 mol) of 3,5-dinitro-2-(3-hydroxypyrrolidin-1-yl)pyridine obtained according to Protocol A from 2-chloro-3,5-dinitropyridine and 3-hydroxypyrrolidine, were reduced according to Protocol B, to give 1.1 g of N-(3,5-diaminopyrid-2-yl)-3-hydroxypyrrolidine dihydrochloride.

[078] After drying, 0.9 g of solid was obtained.

[079] The NMR and mass spectrometry analyses were in accordance with the expected structure.

Example 3: Synthesis of N-(3,5-diaminopyrid-2-yl)-2-methylpyrrolidine ·1.8 HCl·1 MeOH:



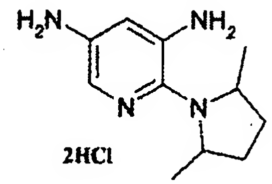
[080] 1.5 g (5.94 mmol) of (2-methylpyrrolidin-1-yl)-3,5-dinitropyridine, obtained according to Protocol A from 2-chloro-3,5-dinitropyridine and 2-methylpyrrolidine, were reduced by hydrogen transfer in 50 ml of ethanol in the presence of palladium-on-charcoal and 5 ml of cyclohexene. After filtering off the catalyst, the hydrochloride salt was isolated by using, during the treatment, a methanolic hydrogen chloride solution. N-(3,5-Diaminopyrid-2-yl)(2-methyl)pyrrolidine·1.8 HCl·1 MeOH was obtained.

[081] After drying to constant weight, 890 mg of solid were obtained.

[082] Theoretical elemental analysis with 1.8 mol of hydrochloric acid and one mole of methanol:

Theory	C: 45.56	H: 7.52	N: 19.33	Cl: 22.07
Found	C: 45.99	H: 7.25	N: 19.00	Cl: 22.92

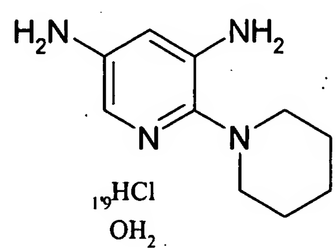
Example 4: Synthesis of N-(3,5-diaminopyrid-2-yl)-2,5-dimethylpyrrolidine dihydrochloride:



[083] 1.5 g (5.63 mmol) of (2,5-dimethylpyrrolidin-1-yl)-3,5-dinitropyridine, obtained according to Protocol A from 2-chloro-3,5-dinitropyridine and 2,5-dimethylpyrrolidine, were reduced by hydrogen transfer in 50 ml of ethanol in the presence of palladium-on-charcoal and 5 ml of cyclohexene. 900 mg of N-(3,5-diaminopyrid-2-yl)-2,5-dimethylpyrrolidine dihydrochloride were obtained.

[084] The NMR and mass spectrometry analyses were in accordance with the expected structure.

Example 5: Synthesis of N-(3,5-diaminopyrid-2-yl)piperidine·1.9 HCl monohydrate

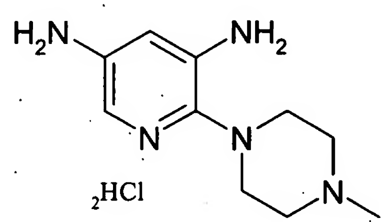


[085] 2 g of (1-piperidyl)-3,5-dinitropyridine, obtained according to Protocol A from 2-chloro-3,5-dinitropyridine and piperidine, were reduced by hydrogen transfer in 50 ml of ethanol in the presence of palladium-on-charcoal and 5 ml of cyclohexene. 930 mg of N-(3,5-diaminopyrid-2-yl)piperidine dihydrochloride were thus obtained.

Theoretical elemental analysis of the monohydrate with 1.9 HCl:

Theory	C: 42.96	H: 7.12	N: 20.05	Cl: 24.14
Found	C: 43.74	H: 7.12	N: 19.57	Cl: 23.99

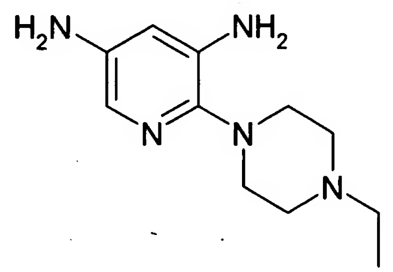
Example 6: Synthesis of 2-(4-methylpiperazin-1-yl)pyridine-3,5-diamine dihydrochloride



[086] 2 g of 1-(3,5-dinitropyrid-2-yl)-4-methylpiperazine, obtained according to Protocol A from 2-chloro-3,5-dinitropyridine and 4-methylpiperazine, were reduced by hydrogen transfer in 50 ml of ethanol in the presence of palladium-on-charcoal and 5 ml of cyclohexene. 1.63 g of 2-(4-methylpiperazin-1-yl)pyridine-3,5-diamine were obtained.

[087] The NMR and mass spectrometry analyses were in accordance with the expected structure:

Example 7: Synthesis of (4-ethylpiperazin-1-yl)pyridine-3,5-diamine trihydrochloride



3. HCl

A) Synthesis of (4-ethylpiperazin-1-yl)-3,5-dinitropyridine

[088] 3 g (14.7 mmol) of 2-chloro-3,5-dinitropyridine, 20 ml of THF and 30 mmol of 4-ethylpiperazine were placed in a round-bottomed flask. The mixture was maintained at 60°C for two hours with stirring and was then poured into a mixture of ice-water with stirring. The precipitate formed was filtered off by suction and dried under vacuum to constant weight. 5 g of yellow powder were obtained.

[089] The NMR and mass spectrometry analyses were in accordance with the expected structure.

B) Synthesis of (4-ethylpiperazin-1-yl)pyridine-3,5-diamine trihydrochloride

[090] 0.8 g (2.8 mmol) of (4-ethylpiperazin-1-yl)-3,5-dinitropyridine, synthesized according to procedure (A) above, 10 ml of ethanol, 2 ml of cyclohexene and 0.5 g of palladium-on-charcoal were placed in a fully equipped round-bottomed flask. The mixture was refluxed for two hours with stirring, the catalyst was then removed by filtration and the filtrate was then acidified with hydrochloric acid. After dilution with diisopropyl ether, the

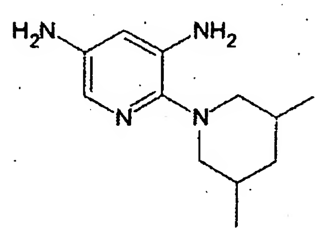
precipitate formed was filtered off by suction and dried under vacuum to constant weight. 0.41 g of powder was obtained.

[091] The NMR and mass spectrometry analyses were in accordance with the expected structure.

Elemental analysis:

C 36.87%/H 7.05%/N 19.73%/Cl 29.41%/O 5.69%

Example 8: Synthesis of 2-(3,5-dimethylpiperid-1-yl)pyridine-3,5-diamine dihydrochloride



2. HCl

A) Synthesis of 2-(3,5-dimethylpiperid-1-yl)-3,5-dinitropyridine

[092] 2 g (9.82 mmol) of 2-chloro-3,5-dinitropyridine, 10 ml of THF and 20 mmol of 3,5-dimethylpiperidine were placed in a round-bottomed flask. he mixture was maintained at 60°C for 15 hours with stirring and was then poured into a mixture of ice-water with stirring. The precipitate formed was filtered off by suction and dried under vacuum to constant weight. 2.55 g of yellow powder were obtained.

[093] The NMR and mass spectrometry analyses were in accordance with the expected structure.

B) Synthesis of 2-(3,5-dimethylpiperid-1-yl)pyridine-3,5-diamine dihydrochloride

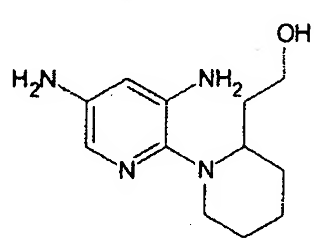
[094] 1.27 g (7 mmol) of 2-(3,5-dimethylpiperid-1-yl)-3,5-dinitropyridine, synthesized according to procedure (A) above, 20 ml of ethanol, 5 ml of cyclohexene and 1 g of palladium-on-charcoal were placed in a fully equipped round-bottomed flask. The mixture was refluxed for two hours with stirring, the catalyst was then removed by filtration and the filtrate was then acidified with hydrochloric acid. After dilution with diisopropyl ether, the precipitate formed was filtered off by suction and dried under vacuum to constant weight. 1.32 g of powder were obtained.

[095] The NMR and mass spectrometry analyses were in accordance with the expected structure.

Elemental analysis:

C 48.71%/H 7.92%/N 18.96%/Cl 23.08%/O 3.03%

Example 9: Synthesis of 2-(1-(3,5-diaminopyrid-2-yl)piperid-2-yl)ethanol dihydrochloride



2. HCl

A) Synthesis of 2-(1-(3,5-dinitropyrid-2-yl)piperid-2-yl)ethanol

[096] 3 g (14.7 mmol) of 2-chloro-3,5-dinitropyridine, 10 ml of THF and 30 mmol of 2-piperidinethanol were placed in a round-bottomed flask. The mixture was maintained at 60°C for 15 hours with stirring and was then poured into an ice-water mixture with stirring. The precipitate formed was filtered off by suction and dried under vacuum to constant weight. 3.71 g of yellow powder were obtained.

[097] The NMR and mass spectrometry analyses were in accordance with the expected structure.

B) Synthesis of 2-(1-(3,5-diaminopyrid-2-yl)piperid-2-yl)ethanol dihydrochloride

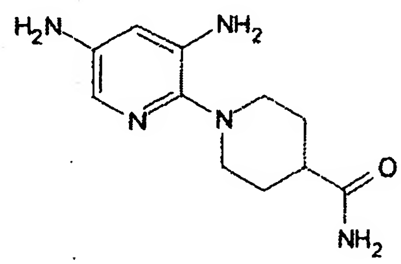
[098] 1.95 g (6.6 mmol) of 2-(1-(3,5-dinitropyrid-2-yl)piperid-2-yl)ethanol, synthesized according to procedure (A) above, 20 ml of ethanol, 5 ml of cyclohexene and 1.5 g of palladium-on-charcoal were placed in a fully equipped round-bottomed flask. The mixture was refluxed for two hours with stirring, the catalyst was then removed by filtration and the filtrate was then acidified with hydrochloric acid. After dilution with diisopropylether, the precipitate formed was filtered off by suction and dried under vacuum to constant weight. 1.55 g of powder were obtained.

[099] The NMR and mass spectrometry analyses were in accordance with the expected structure.

Elemental analysis:

C 44.27%/H 7.6%/N 16.34%/Cl 22.16%/O 10.30%

Example 10: Synthesis of 1-(3,5-diaminopyrid-2-yl)piperidine-4-carboxamide dihydrochloride



2. HCl

A) Synthesis of 1-(3,5-dinitropyrid-2-yl)piperidine-4-carboxamide

[0100] 3 g (14.7 mmol) of 2-chloro-3,5-dinitropyridine, 10 ml of THF and 30 mmol of 4-piperidine carboxamide were placed in a round-bottomed flask. The mixture was maintained at 60°C for 15 hours with stirring and was then poured into an ice-water mixture with stirring. The precipitate formed was filtered off by suction and dried under vacuum to constant weight. 0.522 g of yellow powder was obtained.

[0101] The NMR and mass spectrometry analyses were in accordance with the expected structure.

B) Synthesis of 1-(3,5-diaminopyrid-2-yl)piperidine-4-carboxamide dihydrochloride

[0102] 1.93 g (6.5 mmol) of 1-(3,5-nitropyrid-2-yl)piperidine-4-carboxamide, synthesized according to procedure (A) above, 20 ml of ethanol, 5 ml of cyclohexene and 1.5 g of palladium-on-charcoal were placed in a fully equipped round-bottomed flask. The mixture was refluxed for two hours with stirring, the catalyst was then removed by filtration and the filtrate was then acidified with hydrochloric acid. After dilution with diisopropyl

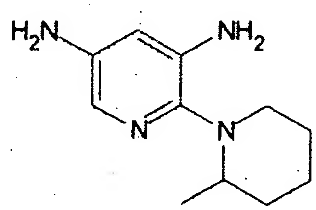
ether, the precipitate formed was filtered off by suction and dried under vacuum to constant weight. 1.2 g of powder were obtained.

[0103] The NMR and mass spectrometry analyses were in accordance with the expected structure.

Elemental analysis:

C 40.94%/H 6.97%/N 21.23%/Cl 21.47%/O 10.77%

Example 11: Synthesis of 2-(2-methylpiperidin-1-yl)pyridine-3,5-diamine dihydrochloride



2. HCl

A) Synthesis of 2-(2-methylpiperidin-1-yl)-3,5-dinitropyridine

[0104] 2.5 g (12.28 mmol) of 2-chloro-3,5-dinitropyridine, 10 ml of THF and 25 mmol of 2-methylpiperidine were placed in a round-bottomed flask. The mixture was maintained at 60°C for 15 hours with stirring and was then poured into an ice-water mixture with stirring. The precipitate formed was filtered off by suction and dried under vacuum to constant weight. 3.09 g of yellow powder were obtained.

[0105] The NMR and mass spectrometry analyses were in accordance with the expected structure.

B) Synthesis of 2-(2-methylpiperidin-1-yl)pyridine-3,5-diamine dihydrochloride

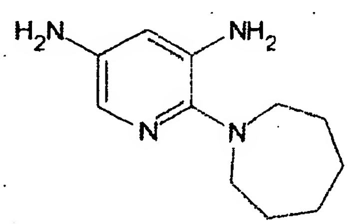
[0106] 1.72 g (6.5 mmol) of 2-(2-methylpiperidin-1-yl)-3,5-dinitropyridine, synthesized according to procedure (A) above, 20 ml of ethanol, 5 ml of cyclohexene and 1.5 g of palladium-on-charcoal were placed in a fully equipped round-bottomed flask. The mixture was refluxed for two hours with stirring, the catalyst was then removed by filtration and the filtrate was then acidified with hydrochloric acid. After dilution with diisopropyl ether, the precipitate formed was filtered off by suction and dried under vacuum to constant weight. 1.24 g of powder were obtained.

[0107] The NMR and mass spectrometry analyses were in accordance with the expected structure.

Elemental analysis:

C 45.34%/H 7.47%/N 18.71%/Cl 22.01%/O 5.56%

Example 12: Synthesis of 2-azepan-1-ylpyridine-3,5-diamine dihydrochloride



2. HCl

A) Synthesis of 2-azepan-1-yl-3,5-dinitropyridine

[0108] 3 g (14.7 mmol) of 2-chloro-3,5-dinitropyridine, 10 ml of THF and 30 mmol of azepane were placed in a round-bottomed flask. The mixture was maintained at 60°C for 15 hours with stirring and was then poured into an ice-water mixture with stirring. The precipitate formed was filtered off by suction and dried under vacuum to constant weight. 1.64 g of yellow powder were obtained.

[0109] The NMR and mass spectrometry analyses were in accordance with the expected structure.

B) Synthesis of 2-azepan-1-ylpyridine-3,5-diamine dihydrochloride

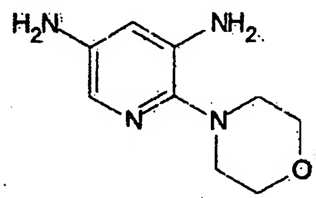
[0110] 1.66 g (6.25 mmol) of 2-azepan-1-yl-3,5-dinitropyridine, synthesized according to procedure (A) above, 20 ml of ethanol, 5 ml of cyclohexene and 1.5 g of palladium-on-charcoal were placed in a fully equipped round-bottomed flask. The mixture was refluxed for two hours with stirring, the catalyst was then removed by filtration and the filtrate was then acidified with hydrochloric acid. After dilution with diisopropyl ether, the precipitate formed was filtered off by suction and dried under vacuum to constant weight. 1.03 g of powder were obtained.

[0111] The NMR and mass spectrometry analyses were in accordance with the expected structure.

Elemental analysis:

C 40.46%/H 6.88%/N 18.47%/Cl 23.37%/O 9.74%

Example 13: Synthesis of 2-morpholin-4-ylpyridine-3,5-diamine dihydrochloride



2HCl

A) Synthesis of 2-morpholin-4-yl-3,5-dinitropyridine

[0112] 5 g (24.5 mmol) of 2-chloro-3,5-dinitropyridine, 40 ml of THF and 50 mmol of morpholine were placed in a round-bottomed flask. The mixture was maintained at 60°C for 15 hours with stirring and was then poured into an ice-water mixture with stirring. The precipitate formed was filtered off by suction and dried under vacuum to constant weight. 6.09 g of yellow powder were obtained.

[0113] The NMR and mass spectrometry analyses were in accordance with the expected structure.

B) Synthesis of 2-morpholin-4-ylpyridine-3,5-diamine dihydrochloride

[0114] 3.5 g (13.76 mmol) of 2-morpholin-4-yl-3,5-dinitropyridine, synthesized according to procedure (A) above, 20 ml of ethanol, 5 ml of cyclohexene and 2 g of palladium-on-charcoal were placed in a fully equipped round-bottomed flask. The mixture was refluxed for two hours with stirring, the catalyst was then removed by filtration and the filtrate was then acidified with hydrochloric acid. After dilution with diisopropyl ether, the precipitate formed was filtered off by suction and dried under vacuum to constant weight. 0.98 g of powder was obtained.

[0115] The NMR and mass spectrometry analyses were in accordance with the expected structure.

EXAMPLES OF DYEING

EXAMPLES A: Examples 1 to 24 of dyeing in alkaline medium

Examples	1	2	3	4	5	6	7	8
N-(3,5-diamino-pyridin-2-yl) pyrrolidine	4×10^{-4} mol				4×10^{-4} mol			
N-(3,5-diamino-pyridin-2-yl)-3-hydroxy-pyrrolidine		4×10^{-4} mol				4×10^{-4} mol		
N-(3,5-diamino-pyridin-2-yl)-2-methylpyrrolidine			4×10^{-4} mol				4×10^{-4} mol	
N-(3,5-diamino-pyridin-2-yl) piperidine				4×10^{-4} mol				4×10^{-4} mol
7-methylamino-3-aminopyrazolo [1,5-a]pyrimidine dihydrochloride	4×10^{-4} mol	4×10^{-4} mol	4×10^{-4} mol	4×10^{-4} mol				
7-dimethylamino-3-aminopyrazolo [1,5-a]pyrimidine dihydrochloride					4×10^{-4} mol	4×10^{-4} mol	4×10^{-4} mol	4×10^{-4} mol
Dye support (1)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Demineralized water qs	100g	100g	100g	100g	100g	100g	100g	100g

Examples	9	10	11	12	13	14	15	16
N-(3,5-diamino pyridin-2-yl) pyrrolidine	4×10^{-4} mol				4×10^{-4} mol			
N-(3,5-diamino-pyridin-2-yl)-3-hydroxypyrrolidine		4×10^{-4} mol				4×10^{-4} mol		
N-(3,5-diamino-pyridin-2-yl)-2-methylpyrrolidine			4×10^{-4} mol				4×10^{-4} mol	
N-(3,5-diamino-pyridin-2-yl) piperidine				4×10^{-4} mol				4×10^{-4} mol
3-aminopyrazolo [1,5-a]pyridine dihydrochloride	4×10^{-4} mol	4×10^{-4} mol	4×10^{-4} mol	4×10^{-4} mol				
4,5-diamino-1-(2-hydroxyethyl) pyrazole dihydro-chloride					4×10^{-4} mol	4×10^{-4} mol	4×10^{-4} mol	4×10^{-4} mol
Dye support (1)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Demineralized water qs	100g	100g	100g	100g	100g	100g	100g	100g

Examples	17	18	19	20	21	22	23	24
N-(3,5-diamino pyridin-2-yl) pyrrolidine	4×10^{-4} mol				4×10^{-4} mol			
N-(3,5-diamino-pyridin-2-yl)-3-hydroxypyrrolidine		4×10^{-4} mol				4×10^{-4} mol		
N-(3,5-diamino-pyridin-2-yl)-2-methylpyrrolidine			4×10^{-4} mol				4×10^{-4} mol	
N-(3,5-diamino-pyridin-2-yl) piperidine				4×10^{-4} mol				4×10^{-4} mol
1,3-bis(4,5-diaminopyrazol-1-yl)propane dihydrochloride	4×10^{-4} mol	4×10^{-4} mol	4×10^{-4} mol	4×10^{-4} mol				
3-methyl-4,5-diamino-1-ethylpyrazole dihydrochloride					4×10^{-4} mol	4×10^{-4} mol	4×10^{-4} mol	4×10^{-4} mol
Dye support (1)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Demineralized water qs	100g	100g	100g	100g	100g	100g	100g	100g

<u>(*) Dye support (1) pH 7</u>

DMSO	0.18 g
96° Ethyl alcohol	9.3 g
Methyl alcohol	39.7 g
Acetic acid	4.4 g
Sodium metabisulphite	0.204 g
Pentasodium salt of diethylenetriaminepentacetic acid as an aqueous 40% solution	1.1 g

C_8-C_{15}alkyl polyglucoside sold as a 60% solution under the name Oramix CG110 by the company SEPPIC	5.3 g
Benzyl alcohol	1.8 g
Polyethylene glycol containing 8 mol of EO	2.7 g
0.5M ammonium chloride buffer pH 7	31.0 g

[0116] At the time of use, each composition was mixed with one third of its weight of 20-volumes aqueous hydrogen peroxide solution (6% by weight).

[0117] Each mixture obtained was applied to a lock of grey hair containing 90% white hairs. After a leave-in time of 30 minutes, the locks were rinsed, washed with a standard shampoo, rinsed again and then dried.

[0118] The following dyeing results were obtained:

Example	**1**	**2**	**3**	**4**
Shade observed	Grey	Dark violet	Grey	Grey
Example	**9**	**10**	**11**	**12**
Shade observed	Violet-grey	Violet-grey	Violet-grey	Violet-grey
Example	**17**	**18**	**19**	**20**
Shade observed	Bluish-violet grey	Blue-grey	Violet-grey	Light grey

Example	**5**	**6**	**7**	**8**
Shade observed	Grey	Blue-grey	Grey	Grey
Example	**13**	**14**	**15**	**16**
Shade observed	Grey	Grey	Violet	Blue-violet
Example	**21**	**22**	**23**	**24**
Shade observed	Violet-grey	Violet-grey	Grey	Grey

EXAMPLES B OF DYEING IN ALKALINE MEDIUM

Examples 1 to 7

[0119] The following dye compositions were prepared:

Example	1	2	3	4	5	6	7
Compound of Example 7	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol
4-Aminophenol	10^{-3} mol						
Benzene-1,4-diamine hydrochloride		10^{-3} mol					
2-[(4-Amino-phenyl)(2-hydroxy-ethyl)amino]ethanol sulphate			10^{-3} mol				
Pyrimidine-2,4,5,6-tetraamine sulphate				10^{-3} mol			
2-Ethyl-5-methyl-2H-pyrazole-3,4-diamine hydrochloride					10^{-3} mol		
5-Methylpyrazolo [1,5-a]pyrimidine-3,7-diamine hydrochloride						10^{-3} mol	
2-(4,5-Diamino-pyrazol-1-yl)ethanol hydrochloride							10^{-3} mol
Dye support (1)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Demineralized water qs	100 g	100 g	100 g	100 g	100 g	100 g	100 g

<u>(*) Dye support (1) pH 9.5</u>

96° Ethyl alcohol	20.8 g
Sodium metabisulphite as an aqueous 35% solution	0.23 g AM
Pentasodium salt of diethylenetriaminepentaacetic acid as an aqueous 40% solution	0.48 g AM

C_8-C_{10} alkyl polyglucoside as an aqueous 60% solution	3.6 g AM
Benzyl alcohol	2.0 g
Polyethylene glycol containing 8 ethylene oxide units	3.0 g
NH_4Cl	4.32 g
Aqueous ammonia containing 20% NH_3	3.2 g

[0120] Each composition was mixed at the time of use with an equal weight of 20-volumes aqueous hydrogen peroxide solution (6% by weight). A final pH of 9.5 was obtained.

[0121] Each mixture obtained was applied to grey hair containing 90% white hairs. After a leave-in time of 30 minutes, the hair was rinsed, washed with a standard shampoo, rinsed again and then dried.

[0122] The following dyeing results were obtained:

Example	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Shade observed	orange	strong grey	strong blue-green	strong grey	strong violet-grey	strong violet	strong violet-grey

Examples 8 and 9

[0123] The following dye compositions were prepared:

Example	8	9
Compound of Example 13	10^{-3} mol	10^{-3} mol
2-[(4-Aminophenyl)(2-hydroxyethyl)-amino]ethanol sulphate	10^{-3} mol	
Pyrimidine-2,4,5,6-tetraamine sulphate		10^{-3} mol
Dye support (1)	(*)	(*)
Demineralized water qs	100 g	100 g

[0124] See the composition of the dye support (1) pH 9.5 and the application in Examples 1 to 7.

[0125] The following dyeing results were obtained:

Example	8	9
Shade observed	strong blue-green	strong violet-grey

Examples 10 to 15

[0126] The following dye compositions were prepared:

Example	10	11	12	13	14	15
Compound of Example 11	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol
4-Aminophenol	10^{-3} mol					
Benzene-1,4-diamine hydrochloride		10^{-3} mol				
2-[(4-Aminophenyl)(2-hydroxyethyl)-amino]ethanol sulphate			10^{-3} mol			
Pyrimidine-2,4,5,6-tetraamine sulphate				10^{-3} mol		
5-Methylpyrazolo[1,5-a]pyrimidine-3,7-diamine hydrochloride					10^{-3} mol	
2-(4,5-Diaminopyrazol-1-yl)ethanol hydrochloride						10^{-3} mol
Dye support (1)	(*)	(*)	(*)	(*)	(*)	(*)
Demineralized water qs	100 g	100 g	100 g	100 g	100 g	100 g

See the composition of the dye support (1) pH 9.5 and the application in Examples 1 to 7.

[0127] The following dyeing results were obtained:

Example	10	11	12	13	14	15
Shade observed	orange	strong grey	strong green	strong grey	strong violet-grey	strong violet-grey

Examples 16 to 18

[0128] The following dye compositions were prepared:

Example	16	17	18
Compound of Example 12	10^{-3} mol	10^{-3} mol	10^{-3} mol
2-[(4-Aminophenyl)(2-hydroxyethyl)amino]ethanol sulphate	10^{-3} mol		
Pyrimidine-2,4,5,6-tetraamine sulphate		10^{-3} mol	
2-(4,5-Diaminopyrazol-1-yl)ethanol hydrochloride			10^{-3} mol
Dye support (1)	(*)	(*)	(*)
Demineralized water qs	100 g	100 g	100 g

See the composition of the dye support (1) pH 9.5 and the application in Examples 1 to 7.

[0129] The following dyeing results were obtained:

Example	16	17	18
Shade observed	strong blue-green	strong grey	strong violet-grey

Examples 19 to 21

[0130] The following dye compositions were prepared:

Example	**19**	**20**	**21**
Compound of Example 8	10^{-3} mol	10^{-3} mol	10^{-3} mol
2-[(4-Aminophenyl)(2-hydroxyethyl)amino]ethanol sulphate	10^{-3} mol		
Pyrimidine-2,4,5,6-tetraamine sulphate		10^{-3} mol	
2-(4,5-Diaminopyrazol-1-yl)ethanol hydrochloride			10^{-3} mol
Dye support (1)	(*)	(*)	(*)
Demineralized water qs	100 g	100 g	100 g

See the composition of the dye support (1) pH 9.5 and the application in Examples 1 to 7.

[0131] The following dyeing results were obtained:

Example	**19**	**20**	**21**
Shade observed	strong blue-green	strong blue-green grey	strong violet-grey

Examples 22 to 28

[0132] The following dye compositions were prepared:

Example	22	23	24	25	26	27	28
Compound of Example 9	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	
4-Aminophenol	10^{-3} mol						
Benzene-1,4-diamine hydrochloride		10^{-3} mol					
2-[(4-Aminophenyl)(2-hydroxyethyl)-amino]ethanol sulphate			10^{-3} mol				
Pyrimidine-2,4,5,6-tetraamine sulphate				10^{-3} mol			
2-Ethyl-5-methyl-2H-pyrazole-3,4-diamine hydrochloride					10^{-3} mol		
5-Methylpyrazolo[1,5-a]pyrimidine-3,7-diamine hydrochloride						10^{-3} mol	
2-(4,5-Diamino-pyrazol-1-yl)ethanol hydrochloride							10^{-3} mol
Dye support (1)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Demineralized water qs	100 g	100 g	100 g	100 g	100 g	100 g	100 g

See the composition of the dye support (1) pH 9.5 and the application in Examples 1 to 7.

[0133] The following dyeing results were obtained:

Example	22	23	24	25	26	27	28
Shade observed	red	strong grey	strong green	strong grey	strong grey	strong red-grey	strong red-violet grey

Examples 29 to 34

[0134] The following dye compositions were prepared:

Example	29	30	31	32	33	34
Compound of Example 10	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol
4-Aminophenol	10^{-3} mol					
Benzene-1,4-diamine hydrochloride		10^{-3} mol				
2-[(4-Aminophenyl)(2-hydroxyethyl)amino]ethanol sulphate			10^{-3} mol			
Pyrimidine-2,4,5,6-tetraamine sulphate				10^{-3} mol		
5-Methylpyrazolo[1,5-a]pyrimidine-3,7-diamine hydrochloride					10^{-3} mol	
2-(4,5-Diaminopyrazol-1-yl)ethanol hydrochloride						10^{-3} mol
Dye support (1)	(*)	(*)	(*)	(*)	(*)	(*)
Demineralized water qs	100 g	100 g	100 g	100 g	100 g	100 g

See the composition of the dye support (1) pH 9.5 and the application in Examples 1 to 7.

[0135] The following dyeing results were obtained:

Example	**29**	**30**	**31**	**32**	**33**	**34**
Shade observed	orange	strong grey	strong blue-green	grey	strong violet-grey	strong violet-grey

EXAMPLES C OF DYEING IN ACID MEDIUM

Examples 35 to 40

[0136] The following dye compositions were prepared:

Example	35	36	37	38	39	40
Compound of Example 7	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol
Benzene-1,4-diamine hydrochloride	10^{-3} mol					
2-[(4-Aminophenyl)(2-hydroxyethyl)amino]-ethanol sulphate		10^{-3} mol				
Pyrimidine-2,4,5,6-tetraamine sulphate			10^{-3} mol			
2-Ethyl-5-methyl-2H-pyrazole-3,4-diamine hydrochloride				10^{-3} mol		
5-Methylpyrazolo[1,5-a]pyrimidine-3,7-diamine hydrochloride					10^{-3} mol	
2-(4,5-Diaminopyrazol-1-yl)ethanol hydrochloride						10^{-3} mol
Dye support (2)	(*)	(*)	(*)	(*)	(*)	(*)
Demineralized water qs	100 g	100 g	100 g	100 g	100 g	100 g

<u>(*) Dye support (2) pH 7</u>

96° Ethyl alcohol	20.8 g
Sodium metabisulphite as an aqueous 35% solution	0.23 g AM
Pentasodium salt of diethylenetriaminepentaacetic acid as an aqueous 40% solution	0.48 g AM
Sodium metabisulphite as an aqueous 35% solution	3.6 g AM
Benzyl alcohol	2.0 g
Polyethylene glycol containing 8 ethylene oxide units	3.0 g

KH_2PO_4	0.28 g
NaH_2PO_4	0.47 g

[0137] Each composition was mixed at the time of use with an equal weight of 20-volumes aqueous hydrogen peroxide solution (6% by weight). A final pH of 7 was obtained.

[0138] Each mixture obtained was applied to grey hair containing 90% white hairs. After a leave-in time of 30 minutes, the hair was rinsed, washed with a standard shampoo, rinsed again and then dried.

[0139] The following dyeing results were obtained:

Example	**35**	**36**	**37**	**38**	**39**	**40**
Shade observed	strong blue-green grey	strong blue-green	strong blue-violet grey	strong violet-grey	strong violet	strong violet-grey

Examples 41 to 43

[0140] The following dye compositions were prepared:

Example	**41**	**42**	**43**
Compound of Example 13	10^{-3} mol	10^{-3} mol	10^{-3} mol
4-Aminophenol	10^{-3} mol		
2-[(4-Aminophenyl)(2-hydroxyethyl)amino]ethanol sulphate		10^{-3} mol	
Pyrimidine-2,4,5,6-tetraamine sulphate			10^{-3} mol
Dye support (2)	(*)	(*)	(*)
Demineralized water qs	100 g	100 g	100 g

See the composition of the dye support (2) pH 7 and the application in Examples 35 to 40.

[0141] The following dyeing results were obtained:

Example	**41**	**42**	**43**
Shade observed	strong orange-brown	strong blue-green grey	strong grey

Examples 44 to 50

[0142] The following dye compositions were prepared:

Example	**44**	**45**	**46**	**47**	**48**	**49**	**50**
Compound of Example 11	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol
4-Aminophenol	10^{-3} mol						
Benzene-1,4-diamine hydrochloride		10^{-3} mol					
2-[(4-Aminophenyl)(2-hydroxyethyl)amino] ethanol sulphate			10^{-3} mol				
Pyrimidine-2,4,5,6-tetraamine sulphate				10^{-3} mol			
2-Ethyl-5-methyl-2H-pyrazole-3,4-diamine hydrochloride					10^{-3} mol		
5-Methylpyrazolo[1,5-a]pyrimidine-3,7-diamine hydrochloride						10^{-3} mol	
2-(4,5-Diamino-pyrazol-1-yl)ethanol hydrochloride							10^{-3} mol
Dye support (2)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Demineralized water qs	100 g	100 g	100 g	100 g	100 g	100 g	100 g

See the composition of the dye support (2) pH 7 and the application in Examples 35 to 40.

[0143] The following dyeing results were obtained:

Example	**44**	**45**	**46**	**47**	**48**	**49**	**50**
Shade observed	orange	strong grey	strong blue-green	strong grey	strong violet-grey	strong violet-grey	strong violet-grey

Examples 51 to 54

[0144] The following dye compositions were prepared:

Example	**51**	**52**	**53**	**54**
Compound of Example 12	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol
Benzene-1,4-diamine hydrochloride	10^{-3} mol			
2-[(4-Aminophenyl)(2-hydroxy ethyl)amino]ethanol sulphate		10^{-3} mol		
Pyrimidine-2,4,5,6-tetraamine sulphate			10^{-3} mol	
2-(4,5-Diaminopyrazol-1-yl)ethanol hydrochloride				10^{-3} mol
Dye support (2)	(*)	(*)	(*)	(*)
Demineralized water qs	100 g	100 g	100 g	100 g

See the composition of the dye support (2) pH 7 and the application in Examples 35 to 40.

[0145] The following dyeing results were obtained:

Example	**51**	**52**	**53**	**54**
Shade observed	strong grey	strong blue-green	strong grey	strong violet-grey

Examples 55 to 61

[0146] The following dye compositions were prepared:

Example	55	56	57	58	59	60	61
Compound of Example 8	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol
4-Aminophenol	10^{-3} mol						
Benzene-1,4-diamine hydrochloride		10^{-3} mol					
2-[(4-Aminophenyl)(2-hydroxyethyl)amino]-ethanol sulphate			10^{-3} mol				
Pyrimidine-2,4,5,6-tetraamine sulphate				10^{-3} mol			
2-Ethyl-5-methyl-2H-pyrazole-3,4-diamine hydrochloride					10^{-3} mol		
5-Methylpyrazolo[1,5-a]pyrimidine-3,7-di-amine hydrochloride						10^{-3} mol	
2-(4,5-Diamino-pyrazol-1-yl)ethanol hydrochloride							10^{-3} mol
Dye support (2)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Demineralized water qs	100 g	100 g	100 g	100 g	100 g	100 g	100 g

See the composition of the dye support (2) pH 7 and the application in Examples 35 to 40.

[0147] The following dyeing results were obtained:

Example	**55**	**56**	**57**	**58**	**59**	**60**	**61**
Shade observed	orange	strong blue-green grey	strong blue-green	strong grey	strong grey	strong violet-grey	strong violet-grey

Examples 62 to 68

[0148] The following dye compositions were prepared:

Example	62	63	64	65	66	67	68
Compound of Example 9	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol
4-Aminophenol	10^{-3} mol						
Benzene-1,4-diamine hydrochloride		10^{-3} mol					
2-[(4-Aminophenyl)(2-hydroxyethyl)amino]-ethanol sulphate			10^{-3} mol				
Pyrimidine-2,4,5,6-tetraamine sulphate				10^{-3} mol			
2-Ethyl-5-methyl-2H-pyrazole-3,4-diamine hydrochloride					10^{-3} mol		
5-Methylpyrazolo[1,5-a]pyrimidine-3,7-di-amine hydrochloride						10^{-3} mol	
2-(4,5-Diamino-pyrazol-1-yl)ethanol hydrochloride							10^{-3} mol
Dye support (2)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Demineralized water qs	100 g	100 g	100 g	100 g	100 g	100 g	100 g

See the composition of the dye support (2) pH 7 and the application in Examples 35 to 40.

[0149] The following dyeing results were obtained:

Example	62	63	64	65	66	67	68
Shade observed	orange	strong grey	strong blue-green grey	strong grey	strong grey	strong red-violet grey	strong red-violet grey

Examples 69 to 74

[0150] The following dye compositions were prepared:

Example	69	70	71	72	73	74
Compound of Example 10	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol	10^{-3} mol
4-Aminophenol	10^{-3} mol					
Benzene-1,4-diamine hydrochloride		10^{-3} mol				
2-[(4-Aminophenyl)(2-hydroxyethyl)-amino]ethanol sulphate			10^{-3} mol			
Pyrimidine-2,4,5,6-tetra-amine sulphate				10^{-3} mol		
2-Ethyl-5-methyl-2H-pyrazole-3,4-diamine hydrochloride					10^{-3} mol	
2-(4,5-Diaminopyrazol-1-yl)ethanol hydrochloride						10^{-3} mol
Dye support (2)	(*)	(*)	(*)	(*)	(*)	(*)
Demineralized water qs	100 g	100 g	100 g	100 g	100 g	100 g

See the composition of the dye support (2) pH 7 and the application in Examples 35 to 40.

[0151] The following dyeing results were obtained:

Example	69	70	71	72	73	74
Shade observed	orange	strong grey	strong blue-green	strong grey	strong grey	strong violet-grey